

# NASA Science Mission Directorate Earth Science Division



*Lawrence Friedl*  
*Director, Applied Sciences Program*  
**ESIP Federation • Partnership Panel**  
**2012 Winter Meeting**



# ***NASA Earth Science: Applied Sciences Program***

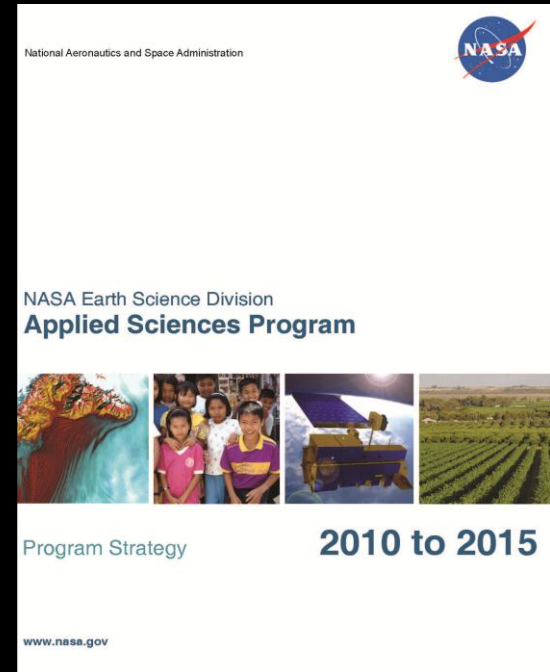


## ***Discovering and demonstrating innovative and practical applications of Earth Science***

The Applied Sciences Program funds projects that enable uses of Earth observations and NASA Earth science in organizations' policy, business, and management decisions.

### ***Applications***

Hands-on projects and studies to prove-out and demonstrate applications ideas targeted at integrating Earth observations in specific decision-making activities



*<http://AppliedSciences.NASA.gov>*

### ***Capacity Building***

Projects and activities to build skills, users, and capabilities in the US and developing countries on how to access and apply environmental satellite data to benefit society

# ***NASA Earth Science: Applied Sciences Program***



## **Goal 1: Enhance Applications Research**

Identify priority needs, conduct applied research to generate innovative applications, and support projects that demonstrate uses of NASA Earth science.

## **Goal 2: Increase Collaboration**

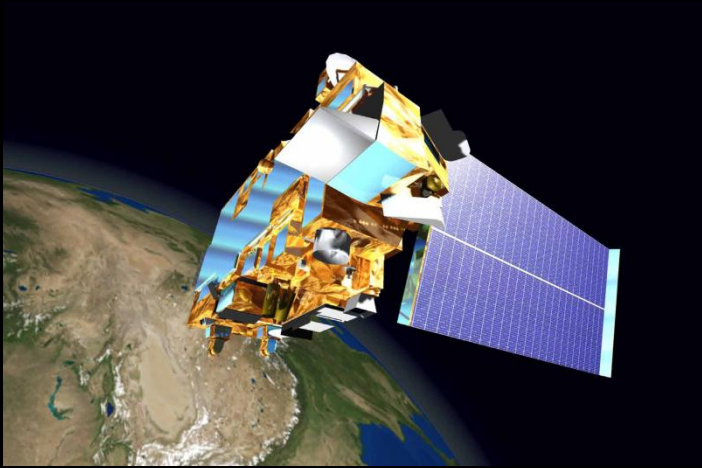
Pursue partnerships to leverage resources and risks and extend the program's reach and impact.

## **Goal 3: Accelerate Applications**

Enable identification of applications early in satellite mission lifecycle and facilitate effective ways to integrate end-user needs into satellite mission planning.



*<http://AppliedSciences.NASA.gov>*



## General Types of Projects

Integrate and transition Earth observations into an existing decision support system of an organization

Create a new decision support system (using Earth obs) and transition to an organization for on-going operations





# ***New:***

## ***Feasibility Studies-to-Decision Support Projects***

### **Objective:**

**Identify and prioritize high-reward applications ideas and committed partners**

**Year 1** Fund a set of Feasibility Studies; partner funding ideal but optional

**Years 2-4** Select a subset of Projects to continue; increased funds from partner

Project	Stage	Activity	NASA Share	Partner Share
Year 1	Feasibility	Prove out application potential	100%	Optional
Year 2	Decision Support	Develop application	~80-85%	~15-20%
Year 3	Decision Support	Continue development	~60-70%	~30-40%
Year 4	Decision Support	Complete application and transition	~30-40%	~60-70%

*Partner is responsible for costs to run its decision support system in subsequent years. If additional activities are needed to assist in the sustained use of the Earth obs., NASA will support additional efforts with in-kind support as possible.*

## **Future Satellite Missions: Study on Latency**

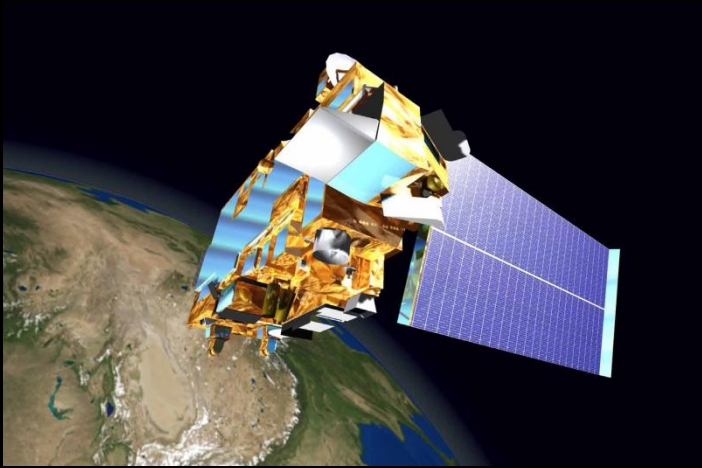
Issue: Data latency is a major factor in the utility of data products for applied and operational uses and some scientific investigations. Many missions have data products that may be extremely valuable if they can reach the applied communities quickly after collection.

### Study:

The study will support the Earth Science community to assess options for meeting latency desires on the missions and inform trade-off decisions regarding mission costs and design.

*Latency & User Needs.* Assess the probable data latency targets for the suite of NASA ESD planned missions

*Latency & Technical Capabilities.* Examine possible methods and mechanisms for delivering data that meets data latency targets

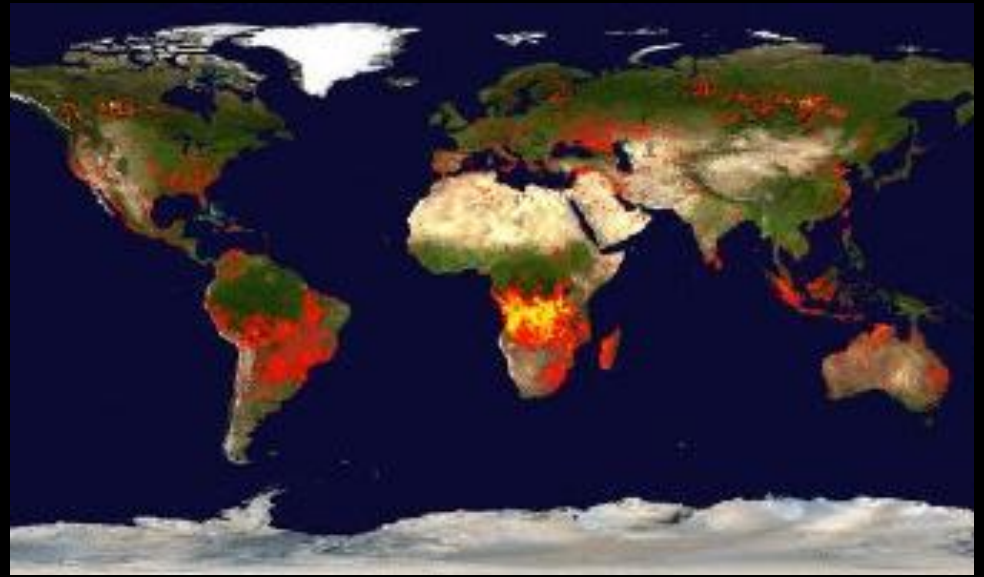


## Partnerships

Alignment of incentives & interests

Organizational culture

Nature of the relationship

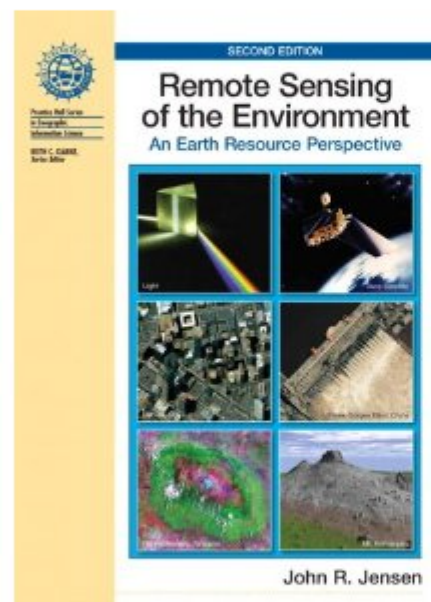


Opportunity for a  
Partnership within the  
Earth Science Community



# Customer Service Standards and Expectations

What are they in the  
Internet age?

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**Ranked #73** of 242 hotels in San Francisco

★★★★☆ 697 Reviews

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| <input checked="" type="checkbox"/> ORBITZ.com     | <input checked="" type="checkbox"/> otel.com    |
| <input checked="" type="checkbox"/> AmExTravel.com | <input checked="" type="checkbox"/> Venere.com  |

\*from our partners

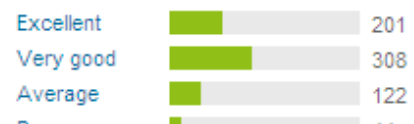
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### What travelers say about this hotel

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|-----------------------|-----------------------------------|
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| • "Cable car" (13)    | • "View lounge" (5)               |
| • "Very nice" (12)    | • "5th floor breakfast room" (11) |

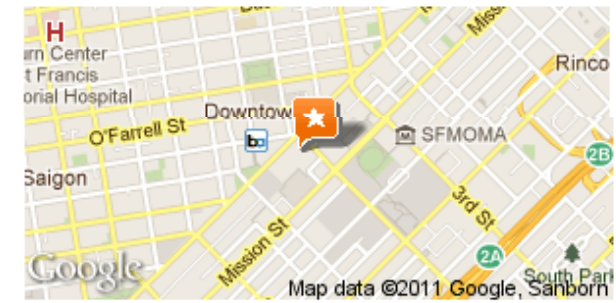
### Traveler rating



### Travelers also viewed...

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**Sebelius Overrules F.D.A. on Freer Sale of Emergency Contraceptives**

The health secretary overruled the Food and Drug Administration's decision that emergency contraceptives be sold freely over the counter, including to teenagers 16 years old and younger.

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## About

The Group on Earth Observations (GEO) strives to enable a healthy public, e...

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## Group on Earth Observations

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On July 28, 2011, Dominica's Matthieu Dam was breached, damaging

Comments from peers

Suggestions

Rating system

Message boards

Personal tailoring

Feedback at the point of experience

One-touch efforts

*and, of course, free shipping on orders over \$25*

# Customer Service Standards and Expectations

Do we follow them?

Do we meet them?



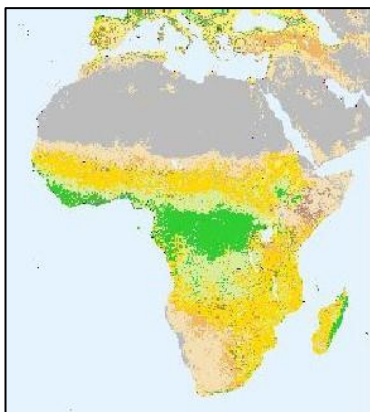
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## Land Cover Type Yearly L3 Global 1km SIN Grid

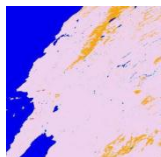
[Terra-MODIS](#)

☆☆☆☆☆ [\(13,769 user reviews\)](#)

Level 3.

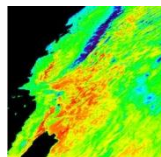
Ships from Land Processes DAAC

### Customers Who Accessed This Item Also Accessed



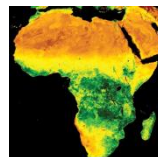
Burned Area

☆☆☆☆☆



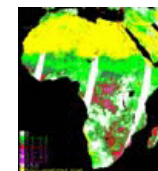
Emissivity (LST)

☆☆☆☆☆



Vegetation (NDVI)

☆☆☆☆☆



Leaf Area Index (FPAR)

☆☆☆☆☆

### Editorial Reviews

MODIS Science Team

The MODIS Land Cover Type product contains multiple classification schemes, which describe land cover properties derived from observations spanning a year's input of Terra data. The primary land cover scheme identifies 17 land cover classes defined by the International Geosphere Biosphere



Programme (IGBP), which includes 11 natural vegetation classes, 3 developed and mosaicked land classes, and three non-vegetated land classes.

The MODIS Terra Land Cover Type Yearly L3 Global 1 km SIN Grid product incorporates five different land cover classification schemes, derived through a supervised decision-tree classification method.

[See all Editorial Reviews](#)

## Product Details

**Product code:** [MOD12Q1](#)

**Platform:** [Terra](#)

**Raster Type:** Tile

**Resolution:** 1000m

**Temporal Granularity:** Annual

**Earth Science Best Sellers Rank:** #142

## Customer Reviews

**Average Customer Review:** ★★★★★ (278 customer reviews)

### Most Helpful Customer Reviews

78 of 81 people found the following review helpful:

Latest product is based on MODIS v.5; found that the urban classification is underrepresented but otherwise a great product.

› [See all 278 customer reviews...](#)

# Users, Behaviors, Preferences

Where and how  
do people get  
their data and  
information?

What are  
demographics  
and user  
characteristics?

attitudes  
aversion to new  
information  
sources  
user traits  
disposition to  
technology  
trusted sources

satisfaction  
factors  
existing value  
chains  
expected level  
of service and  
support

perceptions  
technographics  
familiarity with  
Earth observations  
consumer information  
psychographics  
lifestyle  
preferences

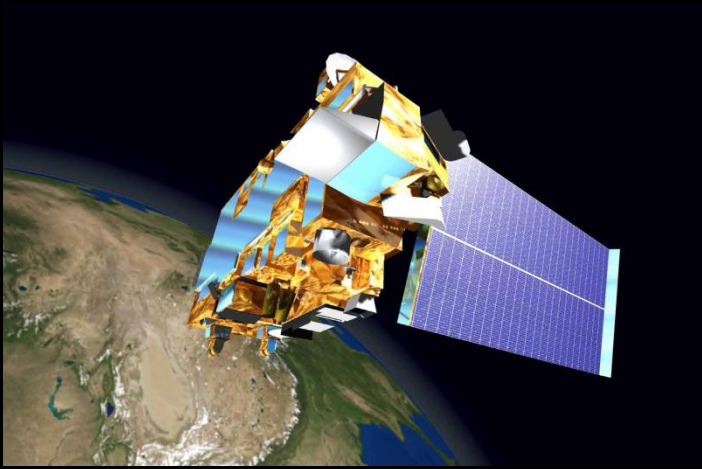
# Challenges to the ESIP Federation:

Self-assessment within Earth science  
and applications community on  
customer service standards

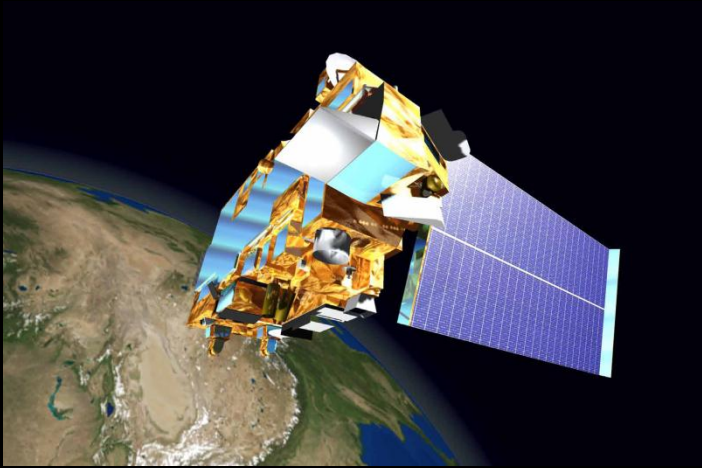
Lead a collaboration on User  
Characterization







Back-up Materials



Partnerships & Collaborations:

*Applications Perspective*

*Partnership Opportunity in  
Earth Science Community*



# Applied Sciences Program

## Applications Readiness Levels

### ARLs

9. Approved, Operational Deployment and Use in Decision Making.
8. Application Completed and Qualified.
7. Application Prototype in Partners' Decision Making.
6. Demonstrate in Relevant Environment.
5. Validation in Relevant Environment.
4. Initial Integration and Verification (in Laboratory Environment).
3. Proof of Application Concept.
2. Application Concept .
1. Basic Research.

*Partner  
Demonstration  
and Transition*

*Development, Test,  
and Validation*

*Discovery and  
Feasibility*

TRL 9

—

TRL 8

—

TRL 7

—

TRL 6

—

TRL 5

—

TRL 4

—

TRL 3

—

TRL 2

—

TRL 1

# GEO and GEOSS

The vision for the Global Earth Observation System-of-System (GEOSS) is to realize a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations and information.



# Global Earth Observation System of Systems

Is GEOSS this vision or is it a means to a vision?

A physical entity?

A concept to motivate an enabling infrastructure of technical standards, policies, and international principles?



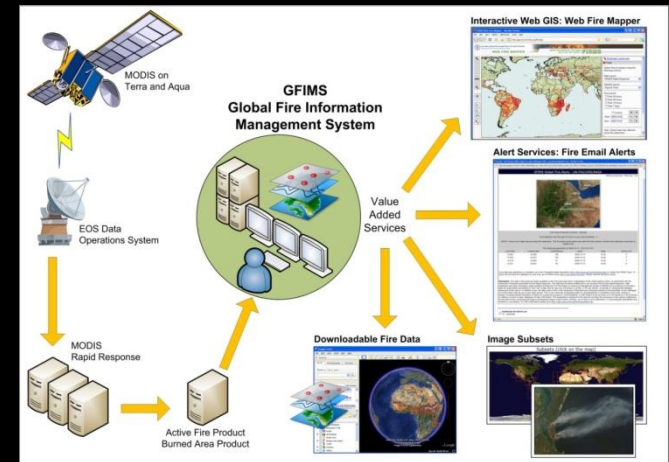


# NASA Earth Science: Applied Sciences Program

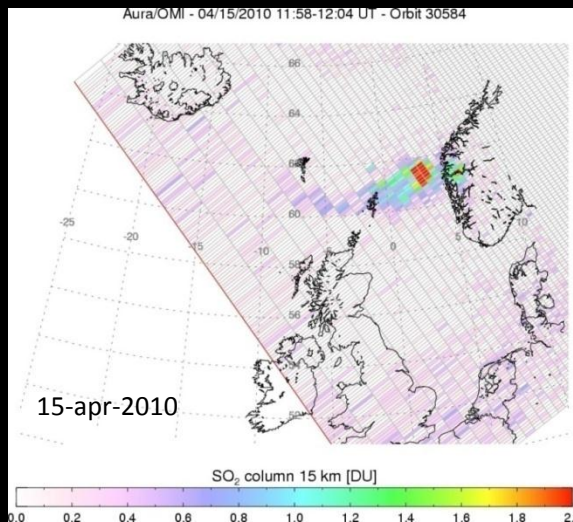


Global active fire locations from MODIS Fire/Thermal Anomalies product are processed in rapid response. SMS/text messages sent out to emails & cell phones with key info (fire coordinates, time, distance to reference point). For example, park managers use alerts to reduce illegal clearing and respond to wildfires.

August 2010: Transitioned to UN FAO for on-going operational support.



System Configuration



OMI SO<sub>2</sub> – Iceland Volcano

Projects developed and demonstrated reliable detection of volcanic ash clouds using Aura/OMI SO<sub>2</sub> data and other NASA Earth science satellite sensors. Proven utility led to its operational use by NOAA to formulate Volcanic Ash Advisories. Products used extensively in Iceland volcano eruption in April 2010.

February 2011: The NASA satellite data were used to produce volcanic ash advisories for aviators across the Gulf of Mexico due to the Feb.1 eruption of the Popocatepetl volcano in Mexico.